

HERPETOLOGY.—*Contributions to the herpetology of Maryland and Delmarva, 13: Piedmont herpetofauna on coastal Delmarva.* CLYDE F. REED, Reed Herpetorium, Baltimore, Md. (Communicated by Doris M. Cochran.)

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The Delmarva Peninsula, which extends from the Pennsylvania border adjacent to Maryland and Delaware on the north, the Susquehanna River and Chesapeake Bay on the west, the Delaware River and Atlantic Ocean on the east, to Cape Charles, Va., and the mouth of the Chesapeake Bay on the south, is made up predominantly of coastal soils. In northern Cecil and New Castle Counties the geological Fall Line passes, dividing the Piedmont from the Coastal Provinces. All land south of the Fall Line is considered as coastal in origin, being composed of sands and alluvial soils. There are no extensive solid rocks or stones in this area.

In eastern United States the Fall Line extends from Georgia northward across the Carolinas and Virginia, passing through the center of Washington, D. C., Baltimore, Wilmington, Philadelphia, across central New Jersey, Long Island, and thence to Cape Cod, Mass. Up to the Potomac River and the Chesapeake Bay, most of the southern Coastal Plain is continuous, being divided here and there by either fresh-water rivers more inland or tidal and low level rivers along the Atlantic coast. The Delmarva Peninsula is definitely isolated by the Chesapeake Bay from this southern Coastal Plain. Southern Maryland is also separated from either of these areas either by the Potomac River from the south or by the Chesapeake Bay to the east. Likewise, southern New Jersey is isolated from the Delmarva Peninsula by the Atlantic Ocean and the Delaware River to the west and south and by other areas of the Atlantic Ocean from Long Island and southern New England.

Most of the large rivers of the southern Coastal Plain have their beginnings in or above the Piedmont region; therefore, it would not be inconceivable to expect to find some Piedmont species of both plants and animals on the Coastal Plain adjacent

to these rivers. In our area the Potomac River flows from the mountain regions west of the southern Maryland Coastal Plain. At the present time the Potomac flows into the Chesapeake Bay about midway up the western side of the bay. However, it is saline and tidal for about 70 miles, up to Washington, D.C.; above that point it is Piedmont, with fresh water, and rocky. The rivers on the western side of southern Maryland which flow into the Potomac River have their origins in the coastal areas of this region, as Mattawoman, Nanjemoy, Wicomico, St. Marys, and Anacostia Rivers. In contrast to these rivers, those on the eastern side of southern Maryland have their origins in the Piedmont region and flow on to the Inner Coastal Plain, as the Little and Big Gunpowder Falls, Patapsco, and Patuxent Rivers; there are some rivers in between these along the Chesapeake Bay which originate on the Coastal Plain and flow directly into the Chesapeake Bay, as Bush, Back, South, West, Severn, and Magothy Rivers.

Two major rivers which have their origins and over 98 percent of their drainage in Piedmont areas flank the Delmarva Peninsula; they are the Susquehanna and the Delaware. The land masses to either side of the Susquehanna River are Piedmont nearly to the mouth of the river at Havre de Grace (Harford County) and Perryville (Cecil County), both of these cities being at the very mouth of this river at the Chesapeake Bay. The Delaware River ceases to be Piedmont north of Philadelphia and becomes quite wide and saline as it approaches Wilmington. It develops into the Delaware Bay separating Delaware from New Jersey.

There are several small rivers and creeks in the northern portion of the Delmarva Peninsula which have their origins on Piedmont soils. Some of them enter the Susquehanna River above the Fall Line, as



Octoraro and Conowingo Creeks in Cecil County. Others flow down from Pennsylvania off the Piedmont on to Coastal regions in Cecil and New Castle Counties, as Little and Big Elk Creeks which form Elk River and the Northeast River; these rivers enter the Chesapeake Bay directly. The Brandywine Creek enters the Delaware River. Between Elk River and Northeast River is a peninsula known as Elk Neck, upon which many species of plants and animals known to be otherwise Piedmont in distribution abound. One would expect to find Piedmont species in this area for several reasons: (1) Rivers with Piedmont origins flow along either side of the peninsula; (2) the land mass is contiguous with the Piedmont soils and areas to the north; (3) this is the end of the land mass, and many species migrating southward find natural barriers on all sides, mainly water; for many it is their most southern distribution on the Delmarva Peninsula.

Except for these few small rivers and creeks in the northern portion of the Peninsula, all the rest of the rivers on the Delmarva Peninsula have their origins within the land mass of the Peninsula. An interesting observation concerning the rivers on the Delmarva Peninsula is that there are very few rivers or creeks of any size on the eastern side, as Appoquinimink and Blackbird Creeks, Smyrna River, Leipsic River, Mispillion Creek, Cedar Creek, Broadkill Creek, and Indian River. None of these creeks or rivers are over 25 miles long, and they all originate in Delaware. On the western side there are many very long rivers, some over 50 miles long, traversing both Delaware and Maryland and emptying into the Chesapeake Bay, as Bohemia, Sassafras, Chester, Choptank, Transquaking, Nanticoke, Wicomico (not the Wicomico River of southern Maryland), and the Pocomoke Rivers. The fresh-water areas from Pocomoke City south to Cape Charles consist mainly of millponds, creeks and drainage ditches. There are very few areas with fresh water drainages of any size, and these soon become saline and marshy before reaching either the Chesapeake Bay or the Atlantic Ocean.

The entire area of the Delmarva Peninsula

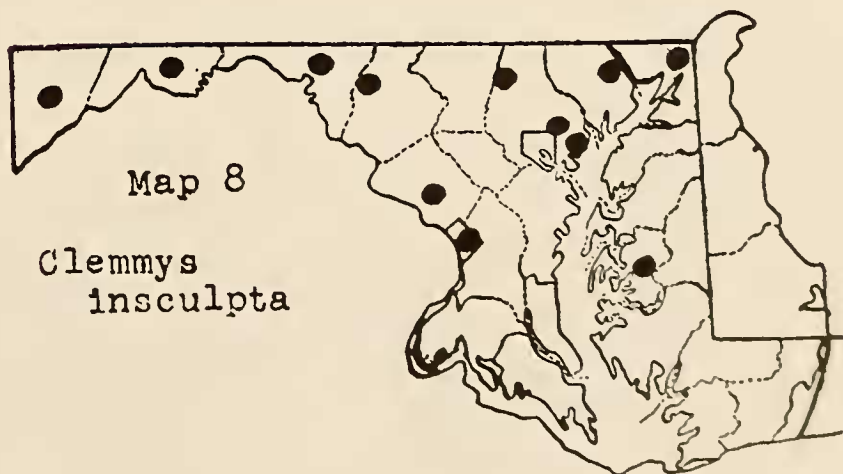
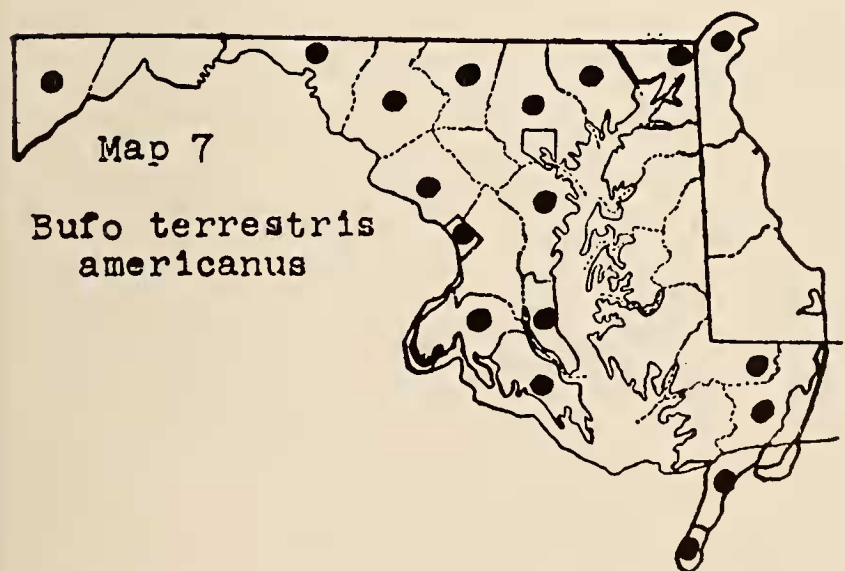
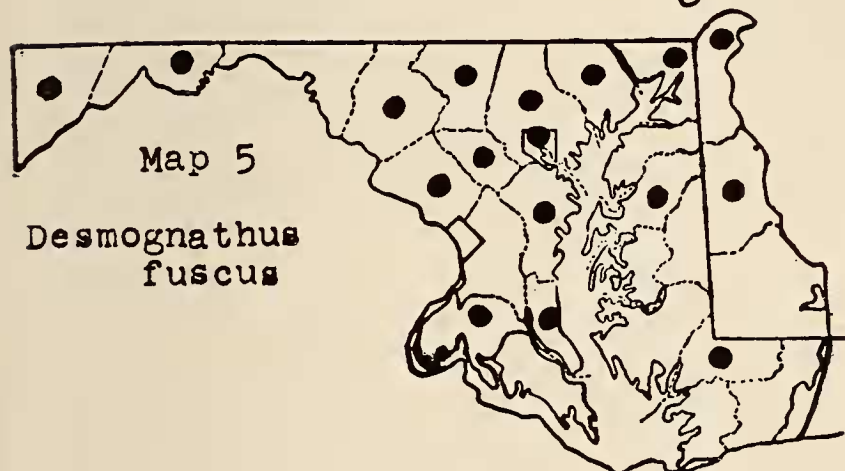
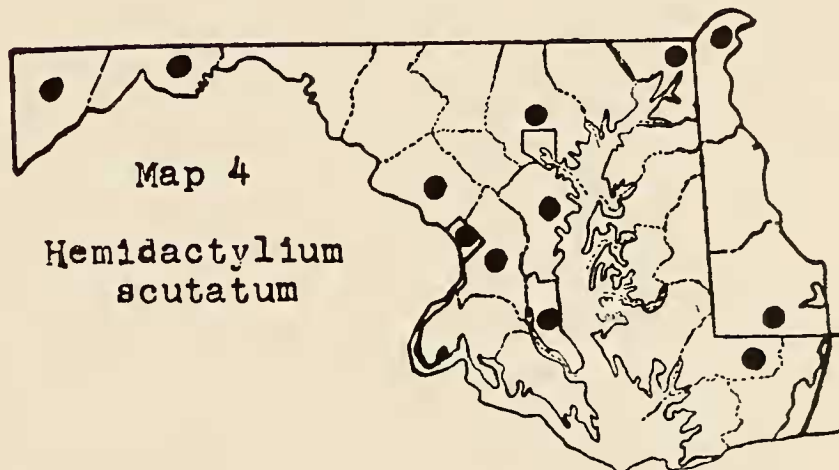
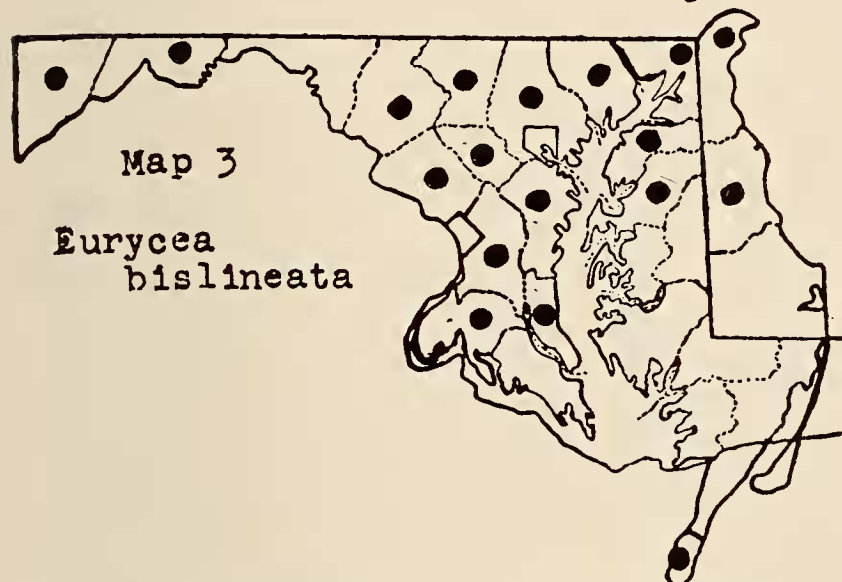
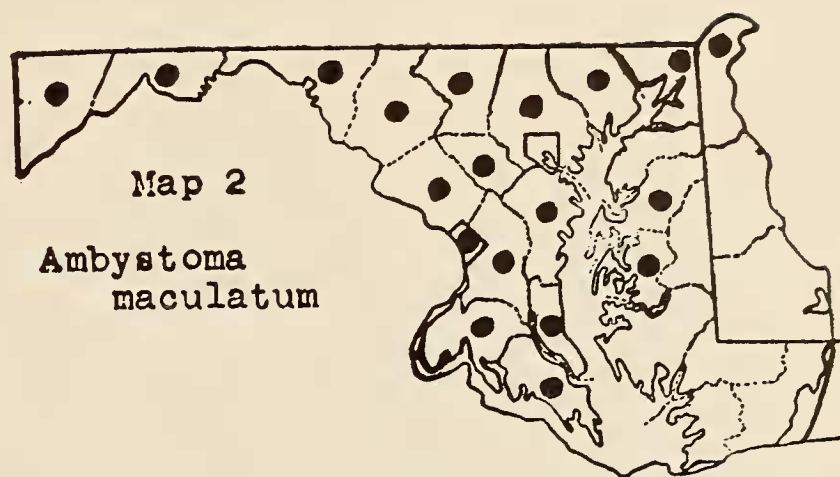
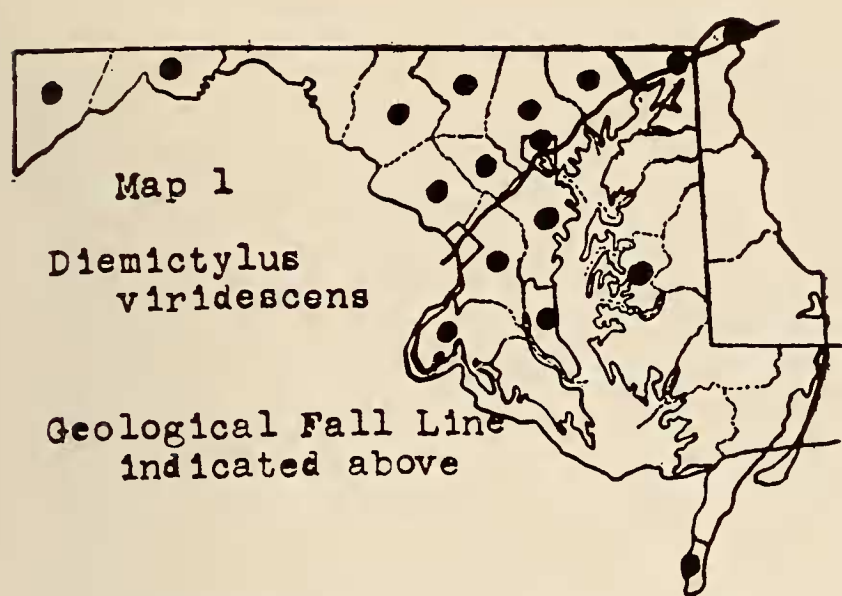
south of the Chesapeake and Delaware Canal, which empties into the Elk River, is Coastal Plain and the land masses east of it (southern New Jersey) and west of it (Maryland, from Havre de Grace to St. Marys City, and Virginia, from the Potomac River to Norfolk) are Coastal Plain, the former being known as Outer Coastal Plain and the latter, as Inner Coastal Plain. On this Coastal Plain there are many areas which possess considerable numbers of Piedmont plants and Piedmont animals. The presence of the animals is much easier to explain than is the presence of the plants.

This paper deals with those species of the herpetofauna that are predominantly Piedmont in distribution in Maryland and the Delmarva Peninsula but that are also known from the Coastal Plain of southern Maryland and the Delmarva Peninsula. Only the counties on Delmarva in which specimens are definitely known to have been collected and are available are listed below. The annotated lists of these species appear in the *Contributions to the Herpetology of Maryland and Delmarva*, no. 6 through no. 11, published by the author; additional records may be found in other *Contributions* (see no. 5 for bibliography).

There are 17 species of herptiles usually considered as being upland or Piedmont which are found on coastal Southern Maryland and on Delmarva. It is interesting to note at this point that many plants also reach their southern limit in this area. These are annotated in another paper dealing with northern Piedmont species of plants which reach their southern limit on Delmarva, or in southern Maryland. Some of these species of plants reach as far south as Accomac County in Delmarva Virginia. There is a Piedmont forest along the Atlantic Ocean from Stockton (Worcester County), Maryland, to Atlantic (Accomac County), Virginia, about 30 miles long and about 10 miles wide. The author has collected about 150 species of Piedmont plants in this area in the last five years. This flora which centers around the town of Silva, Virginia is annotated in a botanical paper; the ferns of which have been published in *Amer. Fern Journ.* **46**: 148-151. 1956.

The maps accompanying this article show

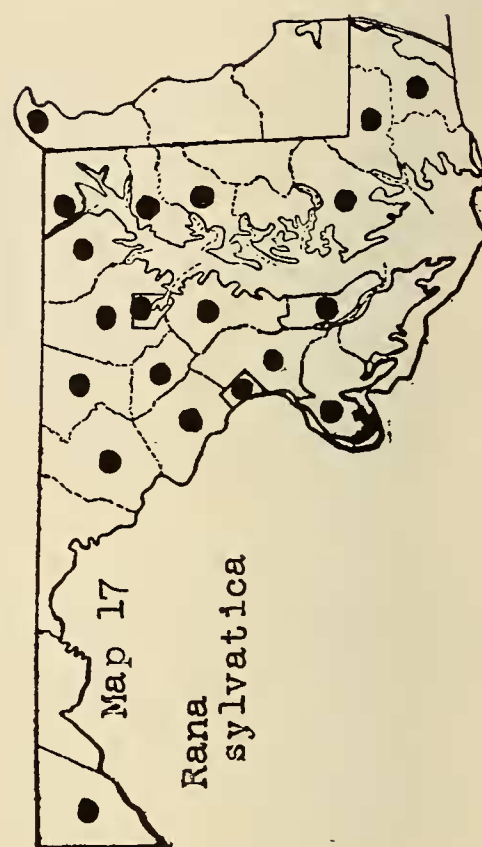
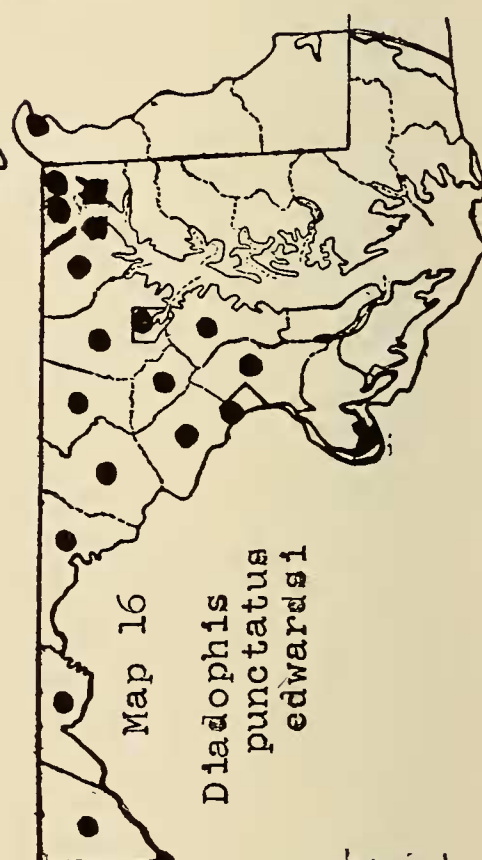
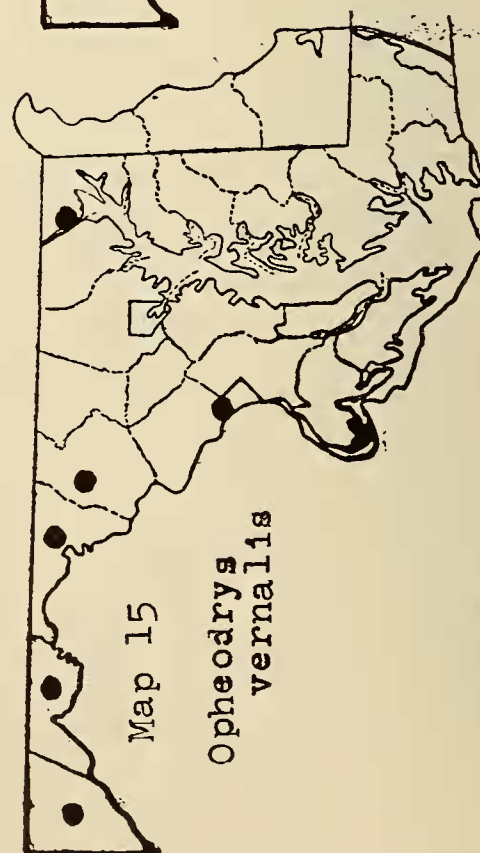
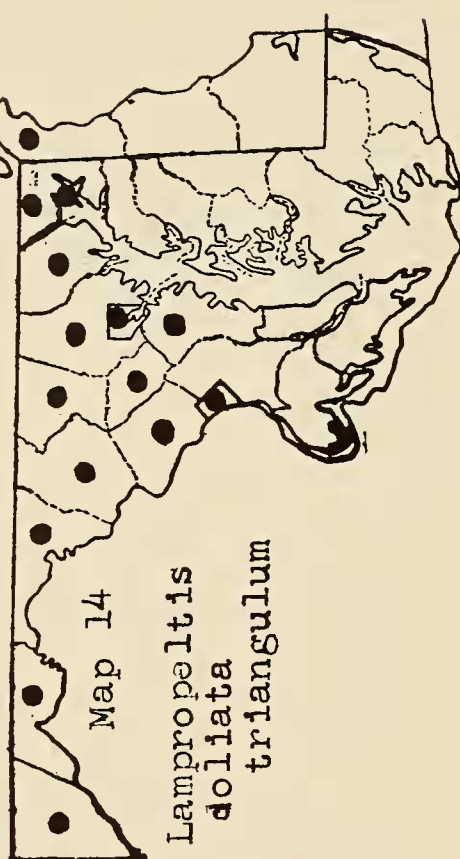
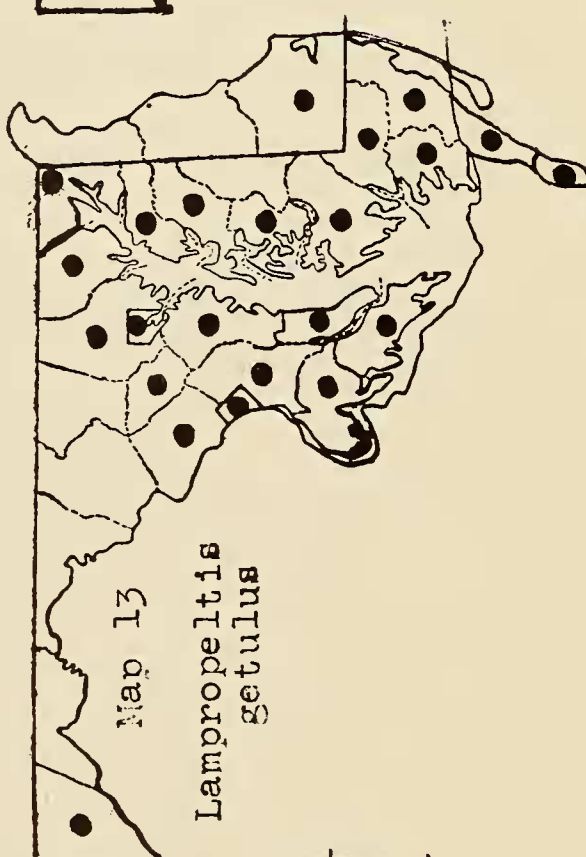
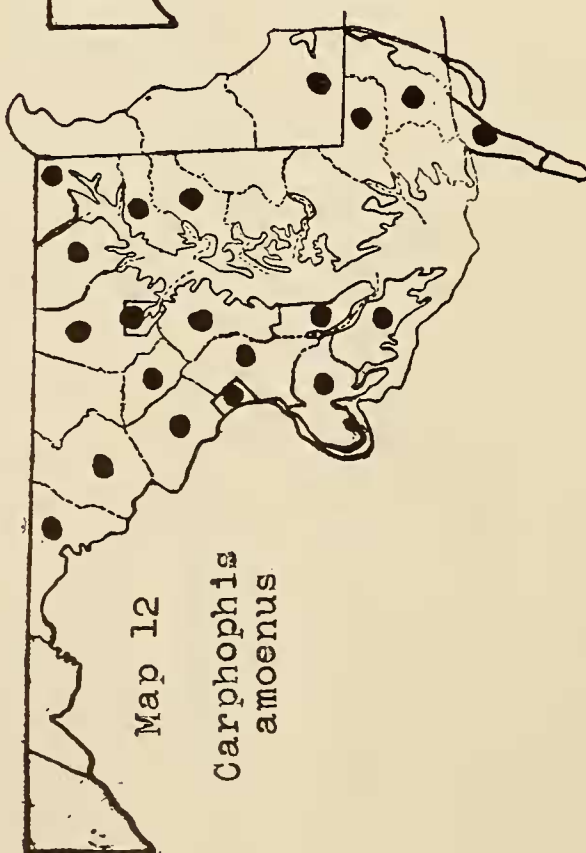
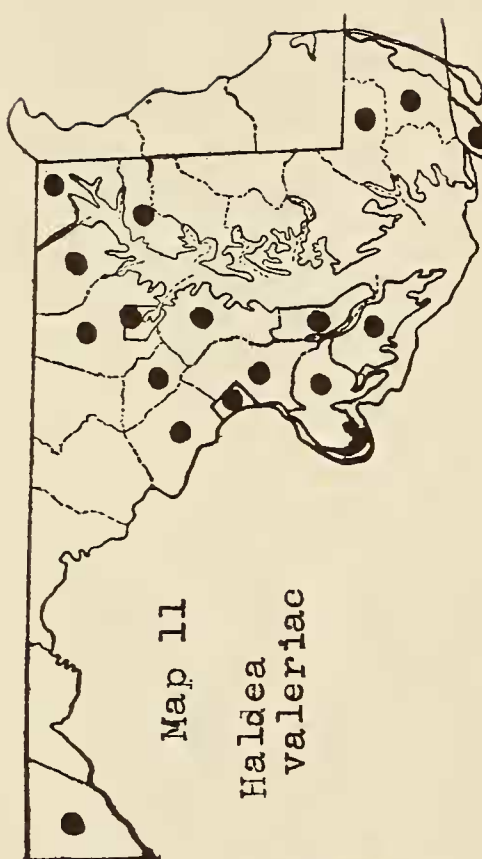
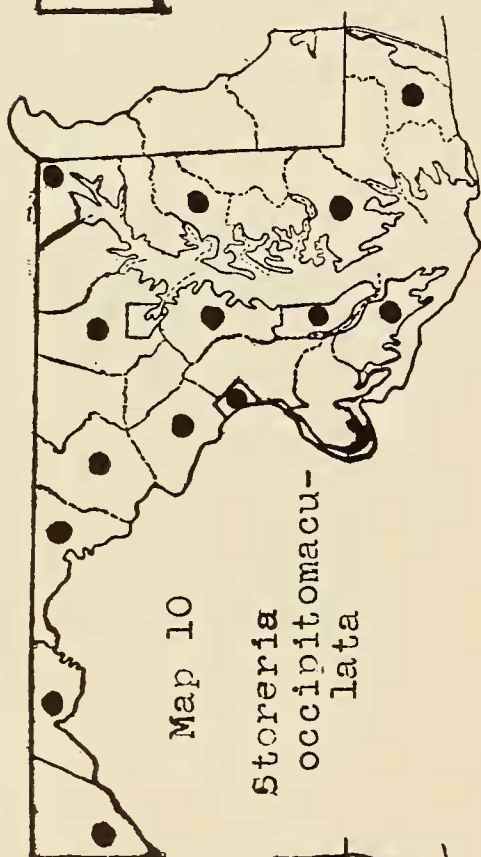
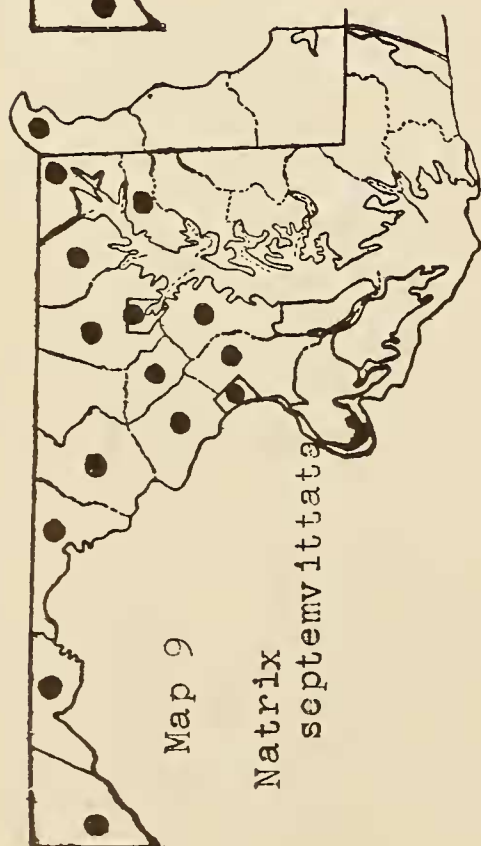




the county distribution in Maryland and Delmarva; the geological Fall Line is indicated and the counties on Delmarva below it are mentioned where Piedmont species of herptiles have been collected.

1. *Diemictylus viridescens viridescens* Rafinesque. New Castle (Newark, Piedmont); Cecil (Octoraro Creek Valley, Piedmont); Talbot (Seth Demonstration Forest); Northampton (Cape Charles). Map 1.

2. *Ambystoma maculata* (Shaw). New Castle





(Wilmington); Cecil (along Susquehanna River from Conowingo to Port Deposit and Elk Neck); Queen Annes (Stine, 1953); Talbot (Stine, 1953). Map 2.

3. *Eurycea bislineata bislineata* (Green). New Castle (Hollyoak near Wilmington); Cecil (Conowingo to Port Deposit); Queen Annes (Centerville); Kent, Md. (near Sassafras River); Kent, Del. (Brown's Branch); Northampton (Eastville). Map 3.

4. *Hemidactylium scutatum* (Schlegel). New Castle (Newark, Piedmont); Cecil (Conowingo to Port Deposit); Sussex (Millsboro); Wicomico (Quantico). Map 4.

5. *Desmognathus fuscus fuscus* (Rafinesque). New Castle (Shellpot Run near Wilmington; Bradywine Creek); Kent, Del. (Brown's Branch); Cecil (Conowingo to Port Deposit; Bainbridge; Pusey Creek; Dove Run); Queen Annes (Centerville); Wicomico (Conant, 1945). Map 5.

6. *Pseudotriton ruber ruber* (Sonnini). Cecil (Elk Neck; Big Bohemia Creek); New Castle (Wilmington; Newark). Map 6.

7. *Bufo terrestris americanus* Holbrook. New Castle (Conant, 1945); Cecil (Elk Neck: along Susquehanna near Octoraro Creek); Kent, Md. (Massey); Wicomico (Conant, 1945); Worcester (Conant, 1945); Accomac (Conant, 1945); Northampton (Hog Island). Map 7.

8. *Clemmys insculpta* (LeConte). Cecil (along Susquehanna below Conowingo); Talbot (Easton). Map 8.

9. *Natrix septemvittata* (Say). New Castle (Newark and Wilmington); Cecil (Elk Neck; Camp Horseshoe; Octoraro Creek; Rodney Scout Camps); Kent, Md. (Chestertown). Map 9.

10. *Storeria o. occipitamaculata* (Storer). Cecil (Elk Neck; Rodney Scout Camps); Queen Annes (Centerville); Dorchester (Blackwater Refuge); Worcester (Pocomoke State Forest; Old Furnace near Snow Hill). Map 10.

11. *Haldea v. valeriae* (Baird and Girard). Cecil (Elk Neck; Rodney Scout Camps; Rising Sun); Kent, Md. (TYPE locality); Wicomico (Quantico); Worcester (Stockton; Old Furnace near Snow Hill; Corbin); Accomac (Silva); Northampton (Hog Island; Cobbs Island). Map 11.

12. *Carphophis a. amoenus* (Say). Cecil (Elk Neck; Rodney Scout Camps); Queen Annes (Carmichael; Centerville; Ruthsburg); Kent, Md. (Conant, 1945); Sussex (Conant, 1945); Wicomico (Conant, 1945); Worcester (Berlin; Pocomoke State Forest); Accomac (Wattsville). Map 12.

13. *Lampropeltis g. getulus* (Linnaeus). Cecil (Port Deposit; Northeast; Elk Neck; Rodney Scout Camps); Kent, Md. (Kennedyville); Queen Annes (Centerville; Crumpton; Queens-town; Ruthsburg); Talbot (Easton); Sussex (Ocean View); Dorchester (Blackwater Refuge; Gum Swamp; Cambridge); Wicomico (Powellville; Quantico; Salisbury; Willards); Worcester (Bishopville; Berlin; Pocomoke River near Snow Hill); Somerset (Westover; Waterloo Farm on Monie Creek); Accomac (Conant, 1945); Northampton (Cape Charles). May 13.

14. *Lampropeltis doliata triangulum* (Lacépède). New Castle (north of Fall Line, Conant, 1945); Cecil (Camp Horseshoe; Conowingo; Rising Sun; Stony Run; Elk Neck). Map 14.

15. *Opheodrys vernalis vernalis* (Harlan). Cecil (Conowingo). Map 15.

16. *Diadophis punctatus edwardsi* (Merrem). New Castle (Wilmington); Cecil (Elk Neck; Gray's Hill; Elkton; Rodney Scout Camps). Map 16.

17. *Rana sylvatica sylvatica* LeConte. New Castle (Townsend); Cecil (Susquehanna River from Conowingo to Port Deposit); Kent, Del. (Brown's Branch); Kent, Md. (Mansueti, 1940); Queen Annes (Mansueti, 1940); Dorchester (Mansueti, 1940); Wicomico (Powellville; Quantico); Worcester (Pocomoke State Forest; Snow Hill). Map 17.

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